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ABSTRACT

Correlates of departmental quality at the masters and doctoral level in regional colleges and universities were studied. The sample of 45 departments represented 14 public institutions in two states and included departments of biology, chemistry, education, history, and mathematics. Based on multivariate linear regression, departmental quality was shown to have small to moderate correlation with 32 variables related to faculty, students, program, and facilities. Many of these variables remained important when other variables were held constant. Moreover, combined measures for faculty (scholarly productivity, age and tenure status, geographical origin of highest degree, and teaching workload), students (number and ability), and program (proportion of institutional degree programs at the graduate level and curricular concentration) were found to explain moderate amounts of variation in departmental quality. While some of the correlates identified support previous research, the findings suggest that the factors associated with graduate departmental quality in regional colleges and universities are more multidimensional than in highly ranked programs in the nation's leading research universities. (Author/SW)

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Predictors of Departmental Quality in Regional Colleges and Universities

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Abstract

This article seeks to isolate correlates of departmental quality at the masters and doctoral level in regional colleges and universities. The sample of 45 departments represented 14 public institutions in two states and included departments in biology, chemistry, education, history, and mathematics. The analysis is based mostly on multivariate linear regression. Departmental quality is shown to have small to moderate correlation with 32 variables related to faculty, students, program, and facilities. Many of these variables remain important when other variables are held constant in order to control for spurious correlation. Moreover, combined measures of faculty (scholarly productivity, age and tenure status, geographical origin of highest degree, and teaching workload), students (number and ability), and program (proportion of institutional degree programs at the graduate level and curricular concentration) were found to explain moderate amounts of variation in departmental quality. Finally, a combination of 10 variables from the pool of 32 variables was found to account for about 60% of the variance in departmental quality. While some of the correlates identified here support previous research, the findings suggest that the factors associated with graduate departmental quality in regional colleges and universities are more multi-dimensional than in highly ranked programs in the nation's leading research universities.

Predictors of Departmental Quality in Regional Colleges and Universities

Concern about "quality" in American higher education can be traced back to the early colonial colleges and efforts to raise admissions standards. In the 20th century, highly visible attempts to address the quality of programs in our colleges and universities include the widespread adoption of accreditation and the first major comparative ranking of institutions by Hughes in 1925.

As we approach the middle of the 1980s, quality has once again emerged as perhaps the most salient issue in higher education (Webster, 1983). Public disenchantment with educational institutions and accompanying pressures for accountability, declining enrollments, and increasingly scarce resources are but three factors that have provided an impetus for colleges and universities to address quality considerations. Whether for purposes of enhancing or preserving quality, much of the contemporary concern about quality has focused on the assessment of departmental quality.

Much of the literature on departmental quality has focused on assessing and ranking departments, professional schools, and sometimes entire institutions. In most of these evaluation studies, quality has been assessed either through a "reputational" approach or through an approach based on "objective" indicators. In reputational studies, judgments of departmental quality are made by panels of peer experts which are usually comprised of faculty well-known in the discipline or field being evaluated. These judgments are combined in order to

generate a rating and ranking of leading departments by institution. Most reputational studies have been conducted at the doctoral level (Cartter, 1966; Conference Board of Associated Research Councils, 1982; Hughes, 1925; Keniston, 1959; Roose & Anderson, 1970), but a few have been conducted at the undergraduate level (Solmon & Astin, 1981) and in professional programs (Cartter & Solmon, 1977; Cole & Lipton, 1977).

In objective indicator studies, quantifiable indicators for assessing departmental quality are selected by the investigator on an a priori basis. In turn, these indicators are combined in an index for rating and ranking leading departments in designated fields. The objective indicators approach has been used by many researchers to identify and rank departments in a variety of fields as well as to generate composite institutional rankings (Adams & Krislov, 1978; Bowker, 1964; Clemente & Sturgis, 1974; Eells, 1960; House & Yeager, 1978; Knudsen & Vaughan, 1969; Krause & Krause, 1970). As in reputational studies, most objective indicator assessments have evaluated departmental quality at the doctoral level.

In recent years another line of research has emerged which does not focus on evaluating departmental quality per se (author identifiable reference). Instead, this research is aimed at identifying objective, quantifiable factors that are associated with departments considered to be of high quality. This approach is aimed at isolating "correlates of quality" which provide a foundation for allowing predictions of departmental quality to be made on the basis of these quantitative correlates. Most of the studies in this tradition have examined the correlates of

departmental quality at the graduate level as measured in the reputational studies by Cartter (1966) and Roose and Anderson (1970), but at least one major study has been completed at the undergraduate level (Astin & Solmon, 1981).

Many of the early studies in this line of research focused on graduate programs in sociology. For example, Lewis (1968) found some correspondence between measures of faculty publication and the Cartter rankings of sociology departments. Other investigators found relationships between the Cartter rankings of sociology departments and various indicators of quality, including individual faculty prestige (Lightfield, 1971), research productivity (Glenn & Villemez, 1970; Knudsen & Vaughan, 1969), and student-faculty ratios (Janes, 1969). Studies conducted later, both in sociology and other single disciplines, identified such correlates as size (Elton & Rogers, 1971; Elton & Rose, 1972) and research productivity (Drew, 1975; Guba & Clark, 1978).

In the last decade, several researchers have worked with subsets of the Cartter and Roose and Anderson departmental rankings. Hagstrom (1971), for example, sampled 125 departments in four scientific fields. He found large, significant correlations between departmental prestige and departmental size, research production, research opportunities, faculty background, student characteristics (including undergraduate selectivity), and faculty awards and offices. Other studies which sampled at least four major fields also found relationships between the Cartter and Roose and Anderson ratings and a range of quantitative correlates: a National Science Board (1969) study isolated 14 correlates

of quality; Beyer and Snipper (1974) identified 14 predictor variables; Morgan, Kearney, and Regens (1976) found four major predictor variables; and Drew and Karpf (1981) identified a powerful single predictor variable--departmental rate of publication in highly cited journals. In short, a range of correlates of departmental quality has been identified in the literature.

Numerous criticisms have been directed at all three major strands of research on departmental quality: reputational, objective indicator, and quantitative correlate (Lawrence & Green, 1980). There are two principal limitations that cut across all three threads. First, nearly all of the studies have focused on departments in top-ranked institutions, with most studies limited to selected departments in fewer than 100 major research universities. Because departments outside of this elite institutional set often have different and more diverse goals, there is reason for skepticism when the techniques for examining or judging the relative quality of leading departments are used in other types of colleges and universities (Solmon & Astin, 1981).

Second, by placing major emphasis on faculty reputation and productivity as the major criterion used both in assessing quality and in identifying correlates of quality, most studies have given relatively little attention to other potentially important dimensions of quality: teaching, student and curricular characteristics, facilities, support, and the quality of the student experience. For example, studies of the quantitative correlates of departmental quality have been quite successful in isolating various correlates of quality. However, most of these

correlates relate to faculty background and scholarly productivity, student selectivity, and department size. Other dimensions of quality have been explored only infrequently in quantitative correlate studies.

In light of these criticisms, the research reported here sought to isolate quantitative correlates of departmental quality in regional colleges and universities. Through refinements in our methodology of correlation assessment, this paper builds upon and extends research that we have reported elsewhere (author identifiable reference). In particular, more extensive efforts have been made to control for spurious correlation through multiple correlation analysis. This refinement allows for a more careful delineation of the correlates of quality and provides a foundation for allowing predictions of departmental quality to be made on the basis of readily available quantitative correlates.

Methods

The study is based on data taken from five departments: biology, chemistry, education, history, and mathematics. (The following discussion of the data base is adapted from our earlier paper on the correlates of departmental quality; see author identifiable reference.) These departments were chosen on the basis of their representativeness of major disciplines and fields of graduate study and in consideration of data availability. Each department had been reviewed at the masters or doctoral level (the majority at the masters level) in 22 public four-year institutions in two contiguous states, which yielded a total of 110 departments. However, because of missing data in many of these departments, the sample was limited to those 45 departments in which sufficient

data were available. These departments, representing 14 institutions, include 12 departments in biology, 9 in chemistry, 6 in education, 10 in history, and 8 in mathematics.

Insert Table 1 about here

Based on a review of the literature on departmental quality, 164 predictor variables were selected for inclusion in the study. As shown in Table 1, these variables were classified into five major categories (faculty, students, program, facilities, and support) and 19 subcategories. Each of the departments in the sample had prepared extensive self-studies that followed a common format. This information was collected for most of the variables in the major categories and subcategories. In addition, Higher Education General Information Survey (HEGIS) reports were used to supplement and corroborate the self-study data, and institutional catalogs provided an additional source of data.

Lack of uniformity in some of the data and missing data reduced the number of variables used in the study from 164 to 73. Of these variables, 41 relate to faculty, 6 to students, 25 to program, 1 to facilities, and none to support. For both the variables originally identified and those variables actually used in the study, Table 1 indicates the number of variables in each of the major categories and subcategories.

As displayed in Table 1, predictor variable measures were produced for two levels: department and institutional. The justification for

the latter was that departments exist within a larger institutional environment. Various characteristics of that environment might be expected to effect the quality of departments located within it.

A majority of the variable measures were generated by aggregating data for individual members/units either as means or as percentages. For example, most measures of faculty scholarly productivity were produced by taking the mean (average per faculty member) for each department. These self-supplied data can be expected to possess high validity (Allison & Steward, 1974; Blackburn, Boberg, O'Connell, & Pellino, 1980).

There were two major problems regarding the predictor variables used in the study. The first problem was that some of the self-study data were not uniformly reported by department chairs and faculty. For example, while faculty curriculum vitae were assumed to comply with a standard format, the information included under a category such as "professional activity" occasionally varied. In all such cases, the values of the relevant variables were treated as missing data. Following these adjustments, the remainder of the self-study date was cross-checked against independently collected data from the respective state higher education agency and with HEGIS reports. Because these data were found it be highly consistent, it was concluded that the 73 predictor variables used in the study had a high degree of reliability.

A second problem concerned missing data. For each of the 73 predictor variables, data were available in at least 2/3 of the 45 cases. This proportion was enough to allow the variables to be retained, but

the missing cases had to be accounted for in the statistical analysis. Values were estimated for each missing case by regressing the corresponding variable on a subset of other variables chosen through a stepwise procedure and then using the fitted value as an estimate for the missing case. Because this is a conservative procedure for estimating missing data, the findings reported here probably underestimate strength of association.

The measure of the dependent variable--departmental quality--was extracted from reports generated independently of this study by teams of external reviewers which reviewed all 45 programs in the sample. A typical team consisted of three experts of national reputation in the discipline being reviewed who were from another geographical region of the United States. Each team conducted site visits; corroborated the departmental self-studies; collected additional data; and interviewed students, faculty, and administrators. For each of the five disciplines, the same team visited all departments in a state. The reviewing team prepared a report which discussed the strengths and weaknesses of each department as well as provided an overall consensus judgment of the quality of the department. These assessments ranged from recommended closure to high praise.

For purposes of statistical analysis, three evaluation experts distinct from the review teams quantified the site visitors' reports by rating each department on a five-point scale. Agreement among the raters was essentially identical in all but two of the 45 departments. The scores on these two departments were adjudicated by rereading and

rescoring. (The rank order of the departmental quality measure did not change after the adjustments were made.) The distribution of departmental ratings is shown in Table 2.

Insert Table 2 about here

The measure of the dependent variable can be likened to the peer review process, which is not without limitations (Cole, Cole, & Simon, 1981). For example, the reports of the external reviewers used in this study included no measures of teaching effectiveness other than a few student comments, and departmental mission was assumed to be the same for all institutions. Despite these limitations, it is clear that the reviewers were judging overall departmental quality, including the quality of the student experience and not just the scholarly reputation and productivity of the faculty. This kind of peer review seems especially appropriate for evaluating departmental quality, especially those departments that have little or no national reputation.

In order to generate findings that would be comparable with previous research, the procedure used here closely parallels the design employed by Hagstrom (1971). The study sought to isolate those variables and combinations of variables that best explain variation in departmental quality.

As an initial step in the analysis, simple correlation coefficients were computed between quality and each of the 73 variables included in the study. Based on their strength of association, 32 of these variables

were retained and provided the pool of variables used in the analysis. The variables retained had correlations which were either of sufficient magnitude to be significantly different from zero at the $p < .05$ level (two-tailed test) or were of an order of magnitude deemed sufficient to merit retention.

Because multiple regression is a preferred technique for examining relationships between a dependent variable and selected predictor variables holding other variables constant, regression analysis was used to isolate the individual variables and combinations of variables that best explain variation in departmental quality. For purpose of analysis, the 32 variables were grouped within 14 of the subgroups identified above. For example, among the subgroups retained were scholarly productivity and teaching workload. Departmental quality was regressed separately on each subgroup of variables. This regression procedure allowed the variables of conceptual similarity to explain as much of the variation in quality as possible and also indicated the relative effect of each predictor variable on departmental quality when other variables in the subgroup were held constant. Using these regression results, the subgroups could be compared based on the percentage of quality which they explain, and the variables within each group could be compared in terms of their relative contribution to departmental quality when controlling for other variables in the subgroup.

In addition, departmental quality was regressed on all 32 variables used in the analysis. A stepwise regression equation was run in which 10 variables were allowed to explain as much of the variation in quality

as possible. Using these regression results, the variation in quality explained by a relatively small set of variables across all the subgroups could be estimated. Moreover, those variables contributing most to explaining variation in departmental quality, taking all other variables into account, could be identified.

Results

Table 3 displays the simple correlation coefficients (zero-order product-moment correlations) between 32 predictor variables and departmental quality. The variables are grouped into four major categories and 14 subgroups.

Insert Table 3 about here

Based on these 32 variables retained for analysis, Table 4 shows the relationship between each of 14 subgroups and departmental quality. The mean elasticity for each variable in Table 4 indicates the effect of each variable on departmental quality when other variables in the group are held constant. A greater elasticity in absolute value indicates a more important contribution. Based on a stepwise regression procedure using all 32 variables in the analysis, Table 5 shows the combined relationship between 10 variables and departmental quality. The mean elasticities in Table 5 give some indication of the effect of each variable on departmental quality when all other variables in the equation are held constant.

Insert Table 4 about here

In the following discussion each subgroup is discussed in terms of the contribution of individual predictor variables (Tables 3, 4, and 5) and the overall contribution of the subgroup (Table 4) in explaining variation in departmental quality. In addition, the findings of the stepwise regression analysis of the combined relationship between 10 selected variables and departmental quality are presented.

Faculty

As displayed in Table 3, four of the seven measures of scholarly productivity retained for analysis have moderate correlations with departmental quality, values which are statistically significant at the $p < .05$ level. When the effects of variables within the subgroup are held constant, four variables emerge as the best predictors of departmental quality (Table 4). Examination of the mean elasticities of the variables in Table 4 reveals that the effects of these four variables--mean yearly publication rate in the last five years, mean number of all publications from 1974-1979, mean number of conference papers in the last five years, and mean number of articles coauthored in local journals in the last five years (negative contribution)--remain important when all other variables in the subgroup are held constant. Owing to correlations among variables in the subgroup, several of the variables with moderate zero-order product-moment correlations (such as the percentage of faculty with four or more career publications) contribute

relatively little when combined in the multivariate linear regression equation (Table 4).

When the 32 variables in the overall stepwise regression procedure are held constant, three of the four variables identified above enter the regression equation (Table 5). Thus, their effects remain important when all other variables in the analysis are accounted for. The measure of scholarly productivity that is the single most important correlate within the subgroup (Table 4)--mean yearly publication rate the last five years--did not enter the regression equation in Table 5.

Turning to the overall contribution of the subgroup in explaining variation in departmental quality, the coefficient of determination (R^2) gives the proportion of variance in departmental quality accounted for by the linear combination of predictor variables in the subgroup. As shown in Table 4, the combination of all seven variables in the scholarly productivity subgroup accounts for 28% of the variance in rated departmental quality. Of the 14 subgroups in the analysis, this subgroup accounts for the third largest amount of variation in departmental quality. However, while these combined measures of scholarly productivity establish that research production is an important component of departmental quality, the amount of variance explained here is considerably less than that found in most studies. Comparable studies have found that from 50% to over 80% of the variance in departmental quality can be explained by one or more measures of scholarly productivity. For example, Drew and Karpf (1981) found that one measure of scholarly productivity--departmental rate of publication in highly

cited journals--correlated very highly (r = .91) with reputational rankings of departmental faculty.

In the literature on program quality, grant support has been shown to be a relatively important factor contributing to research productivity and departmental quality in major research universities (Hagstrom, 1971, p. 384). How important is outside support in the regional colleges and universities studied here? Two measures of "grantsmanship," mean number of grants received and mean dollar value of grants, have small correlations with departmental quality (Table 3). When the relative contribution of each variable is examined controlling for the other variable, mean number of grants received is the better predictor (Table 4). However, neither variable enters the stepwise regression equation (Table 5), and when combined they account for less than 8% of the variance in departmental quality (Table 4). In short, while outside grant support is associated with departmental quality, such support seems to be less important than previous research has suggested.

As shown in Tables 3 and 4, departmental measures of faculty age and tenure--percentage of faculty over 50 years of age and percentage of faculty with tenure—are negatively associated with departmental quality. Controlling for the relative contribution of each variable, percentage of faculty with tenure is the stronger predictor (Table 4). While neither variable in this subgroup enters the multiple linear regression equation in Table 5, the combination of the two variables accounts nevertheless for nearly 11% of the variance in departmental quality (Table 4). However, what is particularly striking about these

findings is less the strength of association than the fact that age and tenure are negatively related to departmental quality. Most studies of faculty productivity have found positive correlations with age and tenure (Blackburn, 1974), but the results reported here clearly dispute those findings.

A single measure of the work experience of faculty outside their current institution can be related to the findings regarding faculty age and tenure. As displayed in Tables 3 and 4, percentage of departmental faculty who have worked nine or more years in government, business, industry, or other colleges and universities is negatively related to departmental quality. While this variable is not statistically significant and does not enter the regression equation in Table 5, it does suggest a negative association between varied work experience and departmental quality. When this finding is coupled with the findings regarding faculty age and tenure, it suggests that less experienced, younger, and untenured faculty contribute disproportionately to departmental quality.

In terms of the educational training of faculty, several studies have found moderate to large positive correlations between reputation of the doctoral-granting institution of faculty and research productivity (Clemente & Sturgis, 1974; Crane, 1965). In this study, a measure of the quality of doctoral-granting institutions--percentage of faculty with their highest degree from a major research university--had a very low correlation with departmental quality and was not included in the final pool of 32 variables. However, several variables concerned with

the educational training of faculty were found related to departmental quality. A measure of the educational qualifications of faculty (percentage of faculty whose highest degree is the terminal degree in their field) was moderately correlated with departmental quality (Table 3) and, by itself, accounts for nearly 6% of the variance in departmental quality (Table 4).

Two measures of the geographical origin of the highest degree of faculty were moderately correlated with departmental excellence; combined they explain over 8% of the variance in program quality (Table 4). One of these variables, percentage of departmental faculty with their highest degree from a university located in the same region, remains significantly associated with departmental quality when all of the variables in the analysis are held constant (Table 5). This finding is particularly intriguing since the expectation had been that this measure would yield a negative correlation because the states and region in the study have lower-rated universities than in other parts of the country.

A measure of teaching workload, mean number of semester hours in which faculty are teaching at the graduate and undergraduate level, was used in the study. This variable had a significant negative correlation (Table 3) with departmental quality, accounting for over 12% of the variance in the dependent variable (Table 4). Because of the moderate correlations between teaching workload and other variables in the analysis, this variable did not enter the multiple linear regression equation presented in Table 5. Nevertheless, this single measure of teaching workload is a strong predictor compared to many of the subgroups examined

here. For example, teaching workload explains nearly twice as much of the variance as educational qualifications of the faculty. It is clear from these findings that lower teaching loads are associated with higher quality programs.

Students

As shown in Table 3, four measures of the number of students enrolled were related to departmental quality. The single measure of student enrollment at the departmental level (number of undergraduate students enrolled in the program) has a small correlation with departmental quality (Table 3) and adds very little predictive power when other variables in the subgroup are held constant (Table 4). However, the three measures of student enrollment at the institutional level (undergraduate, graduate, and combined) all had significant zero-order correlations with departmental quality. Examination of the mean elasticities in Table 4 shows that two of these institutional measures of student enrollment (graduate and combined) remain important when all variables in the subgroup are taken into account. The effects of one of these variables (total student enrollment at the undergraduate level) remain significant when all other variables in the analysis are held constant (Table 5).

When all four of the variables related to student enrollment are combined in a multivariate linear regression equation, they account for over 32% of the variance in departmental quality (Table 4). This subgroup accounts for the largest amount of variation in departmental quality of the 14 subgroups in the study. The large coefficient of

determination strongly indicates that institutional and departmental size, as measured by student enrollment, is an important component of departmental quality. These findings are consistent with studies of the correlates of top-ranked graduate programs which have identified department size as a significant correlate of departmental quality or prestige (Elton & Rogers, 1971; Elton & Rose, 1972; Hagstrom, 1971).

In terms of the academic ability of students, the single measure used here was the mean score for all undergraduate students on the ACT (American College Testing Program) test. Because this measure is highly correlated with other variables used here, it did not enter the multiple linear regression equation shown in Table 5. Still, this variable is a significant correlate of departmental quality (Table 3), accounting by itself for over 9% of the variance in the dependent variable (Table 4). This finding is consistent with other studies which have found a significant relationship between student selectivity and departmental quality (Astin & Solmon, 1981; Hagstrom, 1971).

Program

Three measures of the number of graduate degrees awarded had small correlations with departmental quality (Table 3), accounting for less than 7% of the variance in departmental quality (Table 4). At the institutional level, three measures of the number and range of programs had even smaller correlations with departmental quality (Table 3); when combined, they account for only about 3% of the variance in departmental quality (Table 4). As would be expected, none of the variables in these two subgroups entered the regression equation in Table 5. In short,

while the findings with respect to these two subgroups of variables suggest a relationship between size and program quality, they are clearly less powerful predictors of quality than the measures of student enrollment discussed above.

Two institutional measures of the proportion of institutional program offerings at the graduate level (percentage of degree programs at the specialist and doctoral levels) were moderately related to departmental quality (Table 3). While neither of these variables entered the multiple linear regression equation presented in Table 5, when combined they account for nearly 17% of the variance in departmental quality (Table 4). These findings suggest that departments are likely to be of higher quality when they are located in institutions with a relatively large proportion of degree programs at the doctoral level but few programs at the specialist level.

Finally, two institutional measures of curricular concentration--percentage of undergraduate and graduate students majoring in the natural sciences--had large correlations with departmental quality (Table 3). When combined, they account for nearly 31% of the variation in departmental quality (Table 4). Moreover, the effects of both of these variables remain important when all other variables in the analysis are held constant (Table 5). Thus, the findings reported here strongly suggest that departments located in institutions with a large proportion of graduate and undergraduate students enrolled in the natural sciences are of higher quality. A similar conclusion was reached in a study by Astin and Solmon (1981) which found that highly rated undergraduate

programs were associated with a relatively large concentration of bachelors degrees in the natural sciences.

Facilities

Of the 164 variables originally identified in the study, 19 were included in the facilities category. Because of missing data, however, all but one of the variables had to be dropped from the analysis. The variables dropped included measures of library resources (such as number of bound periodicals in each discipline) and measures of laboratory space and equipment (such as number of laboratories per faculty member). The lone variable remaining, the most common measure of library size or holdings--number of volumes in the library--was significantly related to departmental quality (Table 3). While this measure accounts for only 2% of the variance in departmental quality (Table 4), it does enter the multiple linear regression equations presented in Table 5. Thus, while library size does not by itself explain much of the variation in departmental quality, its effects remain important because it is not highly correlated with the other predictor variables examined in the study.

Multiple Correlations

In order to estimate departmental quality, a stepwise regression analysis was run using all 32 variables in the analysis. Based on this procedure, the combined relationship between 10 variables and departmental quality is displayed in Table 5. The mean elasticity for each variable gives a rough idea of the importance of the variable when the effects of the other variables are held constant. However, no causal

significance should be given the mean elasticities in light of correlations between many of the predictor variables as well as the absence of a theory for justifying the inclusion of exclusion of particular variables.

Insert Table 5 about here

The results of the multiple linear regression equation were tested for significance using the F test on regression. The combined relationship between the 10 independent variables and departmental quality was statistically significant ($F\ [10,34] = 5.04$, $p < .001$). The coefficient of determination indicates the proportion of variance in departmental quality that is accounted for by the linear combination of predictor variables. About 60% of this variance can be accounted for by the 10 variables in Table 5.

While these results are quite good, the amount of variation explained is considerably less than that found in many studies of the quantitative correlates of quality. Hagstrom, for example, in his study of the correlates of prestige in science departments, found that combinations of from six to nine variables could explain about 75% of the variance in departmental quality. He concluded that "unless it is possible to devise some systematic causal theory, it will make little sense to seek additional predictors of departmental prestige or productivity" (1971, p. 389). With most of the variance explained with a small number of variables, any estimate of departmental quality was not going to be

significantly enhanced with the addition of another subtle indicator of departmental quality.

For the problem he and most other researchers set for themselves, Hagstrom probably was right in concluding that there was not much to be gained by further refining measures of departmental quality—at least not for top-ranked programs identified on the basis of reputational ratings. However, the findings reported here suggest that when departmental quality as measured through well-informed peer review is examined in regional colleges and universities, there may be much to be gained by further refining measures of quality. These findings suggest that Hagstrom's judgment may be premature, especially as applied to regional colleges and universities. In short, while these findings are encouraging, they underscore the need to identify additional predictors in order to better predict departmental quality at the graduate level.

Discussion

Of the major quantitative correlates of quality identified in previous studies that were examined here, all have been found to have at least small correlation with departmental quality. Several dimensions of faculty correlated with departmental quality: scholarly productivity, grantsmanship, and educational qualifications. In terms of student characteristics, departmental quality was moderately correlated with measures of the number and ability of students. Moreover, a single measure of library size helped explain variation in departmental quality.

While these findings support previous research, most of the key correlates of quality isolated in earlier research were not found here to have the same degree of association with departmental quality. All of the key correlates previously identified that were examined here—faculty scholarly productivity, faculty grantsmanship, faculty educational qualifications, student enrollment (number), student ability, and library size--were found to be less powerful predictors of departmental quality. For example, most previous studies have found that selected measures of faculty scholarly productivity can account for over 50% of the variation in departmental quality. In this study, however, while individual and combined measures of scholarly productivity were found to be among the better predictors, when combined they explain less than 30% of the variation in departmental quality. Moreover, most studies have been able to explain a larger percentage of the variance in quality with fewer variables. Whereas this study found that about 60% of the variance in quality could be explained by 10 selected variables, most previous studies have been able to explain about 75% of the variance with only a handful of variables.

While the differences between the findings reported here and previous research as regards the relative contribution of certain key correlates are important, no less telling is the finding that departmental quality seems to have qualitative dimensions seldom recognized in previous research. This study has identified a variety of individual and combined measures that are good predictors of departmental quality. Other correlates identified here include measures of faculty teaching

workload (negative correlations), age and tenure status of faculty (negative correlation), graduate degrees awarded, number and range of degree programs, and proportion of institutional degree programs at the graduate level. Two of these correlates identify dimensions of faculty excellence rarely explored, and the other four suggest several new dimensions of program excellence.

Of the dimensions of departmental quality identified in this study, several have been classified as institutional characteristics. These characteristics, largely ignored in earlier research, have been found to have an important influence on departmental quality. Several institutional variables and com inations of variables related to student and program characteristics had moderate to large correlations with departmental excellence. In terms of student characteristics, student enrollment (as measured by total student enrollment at both the graduate and undergraduate level) and student ability were significantly related to departmental quality. As regards program characteristics, number and range of degree proportion of program offerings at the advanced graduate level, and curricular concentration were all associated with departmental quality.

In summary, while some of the correlates of quality isolated here support previous research, these overall results differ from the literature in several important ways. First, these findings suggest that the predictive power of certain key correlates found in previous research may be overstated: all of the key correlates identified in previous research that were examined here were found to be substantially less

powerful predictors of quality. Moreover, the overall stepwise regression in this study used to estimate departmental quality with a small number of variables did not explain the amount of variation found in previous studies. Second, these results suggest that dimensions of program quality, rarely examined in previous research (especially those related to program, student, and institutional characteristics), all contribute to departmental quality. In contrast to previous research, then, these results suggest that variation in quality cannot be so easily explained with a handful of variables, especially those related to faculty characteristics in general and scholarly productivity in particular. In short, these findings suggest that departmental quality is more multi-dimensional than has been previously recognized--that multiple and diverse factors contribute to departmental quality in higher education.

How can we explain the differences between these findings and previous research? One explanation might be that at least some of the differences lie in the measure of the dependent variable--departmental quality. As indicated above, almost all previous studies have measured quality on the basis of departments identified in reputational peer-ratings. Since faculty raters of departmental quality in most reputational studies probably had little knowledge about the overall quality of the programs they were evaluating, it seems likely that their assessment of the quality of various departments often was based upon their judgment of the scholarly reputation and productivity of departmental faculty with whom they were familiar. In turn, it hardly seems

surprising that previous studies have been able to isolate a handful of correlates--many related to faculty scholarly productivity and reputation--that explain much of the variation in quality.

On the other hand, the measure of departmental quality used in this study was extracted from the comprehensive reports of reviewers which were clearly aimed at judging overall program excellence. Since these peer judgments were based on a broad base of information, it does not seem surprising that when the factors previously found highly correlated with departmental quality were correlated in this study with those peer judgments they did not have the same predictive power. The fact that other important correlates and dimensions of quality were identified here may be due in part to the measure of the dependent variable, as well as the fact that these correlates had not been previously investigated.

A second explanation for many of the differences relates to the type of institutions in which departmental quality has been examined. In previous studies, the focus has been on top-ranked departments in major research institutions, while this study has examined departments located in regional colleges and universities. Accordingly, it may be the case that the correlates of departmental quality are different in the two types of institutions. As compared with departments in major research universities, the findings reported here strongly suggest that departmental quality in regional colleges and universities is more multi-dimensional, with multiple and diverse factors contributing to departmental quality.

While both of these explanations may help to account for the differences between this study and previous research, the latter seems to be the more compelling explanation for the simple reason that it is supported by the research reported here. In short, the most plausible explanation for these differences seems to be that the factors contributing to departmental quality have been found here to be somewhat different from and more multi-dimensional than those identified in previous research.

Because the findings of this study raise telling questions about the limitations of the extant literature as applied to regional colleges and universities, the major limitations of the study should be mentioned. First, as discussed earlier, the sample was limited to those 45 departments out of a population of 110 departments for which sufficient data were available. Moreover, missing data reduced the number of variables examined to 73 from an original list of 164 variables and required procedures for estimating missing cases.

Second, the actual variable measures used here are only partial substitutes for the constructs that have been established as dimensions of quality and, in some instances, may be measuring quite different attributes of departmental quality. For example, the percentage of students studying in the natural sciences may be as much an indicator of student selectivity as it is of curricular concentration.

Third, while this study has appreciably widened the dimensions of departmental quality to incorporate factors that rarely have been considered, it has not encompassed all aspects of excellence. In terms

of the dependent variable, departmental quality as assessed through peer review, the external reviewers neither used student outcome data in assessing departmental quality nor did they assess value-added student learning--what students actually learned through pursuing graduate work in a department. Ideally, assessments of quality should include information on student outcomes and value-added student learning. In terms of the predictor variables, one dimension that needs to be explored is what Pace (1980) refers to as the learning "climate," including faculty and student relations and the quality of teaching. Academic leadership represents another possible dimension in which to search for correlates of departmental quality. It may be that department chairpersons and deans are a critical factor in promoting quality.

While the study is not without limitations, several strengths of the study should be mentioned. Since judgments about departmental quality were based on well-informed peer judgments, the measure of the dependent variable in this study seems to be a more defensible measure of departmental quality than the reputational peer-ratings used in previous studies. Moreover, this study explored a larger number and a greater range of potential correlates than in any previous study of the quantitative correlates of quality. Finally, extensive efforts were made to control for spurious correlation through the use of multiple regression analysis. Compared to many previous studies, which did not control for intercorrelations among predictor variables, this procedure allowed for a more careful delineation of the correlates of quality.

In conclusion, the research reported here examined multiple and diverse correlates of departmental quality in regional colleges and universities. The study is exploratory and not without limitations, but the findings strongly suggest that the factors associated with departmental quality are more multi-dimensional in regional colleges and universities than in highly ranked programs at leading research universities. While this study provides a foundation for estimating quality on the basis of quantitative correlates, more research is needed to identify additional quantitative correlates which can help to more fully explain variation in departmental quality.

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Table 1

Predictor Variables, By Category/Subcategory and Level[a]

Category/Subcategory	Departmental Level		Institutional Level	
	Actual[b]	Original[c]	Actual[b]	Original[c]
Faculty				
Status	10	14		
Training/Background	12	16		
Scholarly Productivity	17	24		
Teaching Workload	2	4		
Total	41	58		
Students				
Number	1	6	4	4
Ability	0	0	1	1
Student Characteristics	0	8	0	0
Student Success	0	2	0	0
Total	1	16	5	5
Program				
Graduate Degrees Awarded	3	5	4	4
Number and Range	5	8	7	7
Curricular Concentration	0	0	2	4
Selectivity	0	5	0	0
Rigor	0	5	0	0
Accreditation Status	0	1	2	2

Table 1 (continued)

	Departmental Level		Institutional Level	
	Actual[b]	Original[c]	Actual[b]	Original[c]
Program				
Other	1	2	1	1
Total	9	26	16	18
Facilities				
Library Resources	0	8	1	1
Laboratories/Space/ Equipment	0	7	0	3
Total	0	15	1	4
Support				
Faculty Development/ Scholarship	0	8		
General	0	14		
Total	0	22		
Grand Totals	51	137	22	27

[a]The number of predictor variables, at the departmental and institutional level, is indicated for each category and subcategory displayed in the table.

[b]Indicates the actual number of variables used in the study.

[c]Indicates the number of variables identified initially for possible inclusion in the study.

Table 2

Distribution of 45 Departments by Rated Quality of Graduate Program (Biology, Chemistry, Education, History, Math)

Departmental Quality Rating	Number of Departments	Percent
Excellent, 4.00-5.00	5	11
Good, 3.00-3.99	17	38
Adequate, 2.00-2.99	13	29
Less than Adequate	10	22
Total	45	100

Table 3

Simple Correlation Coefficients Between Selected Predictor Variables and Graduate Departmental Quality

Subgroup/Predictor Variables	Correlation Coefficient[a]	Significance Probability[b]
Faculty		
Scholarly Productivity		
Mean Number of Conference Papers Last Five Years	.36	.007
Mean Yearly Publication Rate Last Five Years	.36	.008
% Faculty With Four or More Career Publications	.26	.040
Mean Number of Articles Published in Local Journals Last Five Years (Joint Author)[c]	- .26	.044
Mean Number of All Publications, 1974-1979	.25	.052
Mean Number of Book Reviews Last Five Years	.18	.122
Mean Number of All Publications, 1968-1973	.10	.256

Table 3 (continued)

Subgroup/Predictor Variable	Correlation Coefficient[a]	Significance Probability[b]
Faculty		
Grantsmanship		
Mean Dollar Value of Grants	.23	.065
Mean Number of Grants Received	.17	.127
Age and Tenure		
% Faculty With Tenure	- .26	.045
% Faculty Over 50 Years of Age	- .23	.061
Work Experience Outside Current Institution		
% Faculty Who Have Worked Nine or More Years in Government, Business, Industry, or Other Colleges and Universities	- .17	.136
Educational Qualifications		
% Faculty Whose Highest Degree is Terminal Degree[d]	.24	.053
Geographical Origin of Highest Degree		
% Faculty With Highest Degree from Regional University	.27	.034
% Faculty With Highest Degree from In-State University[e]	.23	.065

Table 3 (continued)

Subgroup/Predictor Variables	Correlation Coefficient[a]	Significance Probability[b]
Faculty		
Teaching Workload		
Mean Number of Semester Hours Currently Teaching at Both Graduate and Undergraduate Level	- .35	.009
Students		
Number		
Total Student Ernollment at Undergraduate Level (Institution)	.43	.001
Total Student Enrollment at Undergraduate and Graduate Level (Institution)[f]	.42	.002
Total Student Enrollment at Graduate Level (Institution)	.31	.020
Number of Undergraduate Students Enrolled in Program	.22	.073
Ability		
Mean Undergraduate Students ACT Test Score (Institutional)	.31	.020

Table 3 (continued)

Subgroup/Predictor Varibles	Correlation Coefficient[a]	Significance Probability[b]
Program		
Graduate Degrees Awarded		
Total Number of Degrees Awarded Annually at Specialist Level	.23	.064
Total Number of Degrees Awarded Annually at Masters Level	.19	.108
Total Number of Degrees Awarded Annually at Doctoral Level	.11	.232
Number and Range		
Range of Masters Degree Programs (Institution)[g]	.17	.134
Total Number of Doctoral Degree Programs (Institution)	.16	.141
Total Number of Baccalaureate Degree Programs (Institution)	.09	.268
Proportion of Degree Programs at Specialist and Doctoral Level		
% of Degree Programs at Doctoral Level (Institution)	.26	.042
% of Degree Programs at Specialist Level (Institution)	- .19	.108

Table 3 (continued)

Subgroup/Predictor Variables	Correlation Coefficient[a]	Significance Probability[b]
Program		
Curricular Concentration		
% of Undergraduate Students Majoring in the Natural Sciences (Institution)	.54	.001
% of Graduate Students Majoring in the Natural Sciences (Institution)	.46	.001
Facilities		
Library Size		
Number of Volumes in the Library (Institution)	.15	.170

[a]Zero-order produce-moment correlations.

[b]Probability that the true correlation coefficient equals zero or has a sign opposite that of the reported coefficient, based on normally distributed estimated residuals.

[c]Local journals were defined as journals published within the state.

[d]Terminal degrees were defined as Ph.D., J.D., and Ed.D. degrees.

[e]Regional universities were defined as those universities located in states served by the Southern Regional Education Board except Texas and Oklahoma.

Table 3 (continued)

[f]Institutions, in parentheses, refers to institutional variables.

[g]Range was defined as the number of program areas, based on the Higher Education General Information Survey (HEGIS) program classification structure, in which masters level programs were offered.

Table 4

Multiple Correlations Between Selected Subgroups of Related Variables and Graduate Departmental Quality

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Faculty		
Scholarly Productivity		
Mean Yearly Publication Rate Last Five Years	.142	
Mean Number of All Publications, 1974-1979	.136	
Mean Number of Conference Papers Last Five Years	.072	
Mean Number of Articles Published in Local Journals Last Five Years (Joint Author)	- .069	
% Faculty With Four or More Career Publications	- .022	
Mean Number of Book Reviews Last Five Years	.017	
Mean Number of All Publications, 1968-1973	.012	.282

Table 4 (continued)

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Faculty		
Grantsmanship		
Mean Number of Grants Received	.038	
Mean Dollar Value of Grants	.029	.074
Age and Tenure		
% Faculty With Tenure	- .242	
% Faculty Over 50 Years of Age	- .144	.106
Work Experience Outside Current Institution		
% Faculty Who Have Worked Nine or More Years in Government, Business, Industry, or Other Colleges and Universities	- .112	.028
Educational Qualifications		
% Faculty Whose Highest Degree is Terminal Degree	.836	.059
Geographical Origin of Highest Degree		
% Faculty With Highest Degree from Regional University	.198	

Table 4 (continued)

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Faculty		
Geographical Origin of Highest Degree		
% Faculty With Highest Degree from In-State University	.130	.083
Teaching Workload		
Mean Number of Semester Hours Currently Teaching at Both Graduate and Undergraduate Levels	- .486	.124*
Students		
Number		
Total Student Enrollment Undergraduate and Graduate Level (Institution)[a]	2.138	
Total Student Enrollment at Graduate Level (Institution)	- 1.177	
Total Student Enrollment at Undergraduate Level (Institution)	- .090	

Table 4 (continued)

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Students		
Number		
Number of Undergraduate Students Enrolled in Program	.044	.321*
Ability		
Mean Undergraduate Students ACT Score (Institution)	.549	.094*
Program		
Graduate Degrees Awarded		
Total Number of Degrees Awarded Annually at Doctoral Level	- .039	
Total Number of Degrees Awarded Annually at Specialist Level	.031	
Total Number of Dgreees Awarded Annually at Masters Level	.022	.069
Number and Range		
Range of Masters Degree Programs (Institution)	.108	

Table 4 (continued)

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Program		
Number and Range		
Total Number of Baccalaureate Degree Programs (Institution)	.054	
Total Number of Doctoral Degree Programs (Institution)	.028	.034
Proportion of Degree Programs at Specialist and Doctoral Level		
% of Degree Programs at Doctoral Level (Institution)	.160	
% of Degree Programs at Specialist Level (Institution)	- .154	.168*
Curricular Concentration		
% of Undergraduate Students Majoring in the Natural Sciences (Institution)	.355	
% of Graduate Students Majoring in the Natural Sciences (Institution)	.149	.307*

Table 4 (continued)

Subgroup/Variables	Mean Elasticity	Coefficient of Determination (R^2) for Subgroup
Facilities		
Library Size		
Number of Volumes in the Library (Institution)	.076	.021

[a]Institution, in parentheses, refers to institutional varibles.

*Significant at $p < .05$ level, F test on regression.

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Table 5

Stepwise Regression Equation for Quality of Graduate Department and Selected Predictor Variables

Predictor Variable	Mean Elasticity
% of Undergraduate Students Majoring in the Natural Sciences (Institution)	.062
Mean Number of Articles Published in Local Journals in Last Five Years (Joint Author)	- .039
% Faculty With Highest Degree from Regional University	.204*
% Graduate Students Majoring in the Natural Sciences (Institution)	.203
Mean Number of All Publications, 1974-1979	.105
Number of Undergraduate Students Enrolled in Program	.124*
Total Number of Degrees Awarded Annually at Doctoral Level	- .071
Total Student Enrollment at Undergraduate Level (Institution)	.695*
Mean Number of Conference Papers Last Five Years	.080
Number of Volumes in the Library (Institution)	- .135

Coefficient of Determination, $R^2 = .597^*$

*Significant at the .05 level, F test on regression.